

HERNIA

* DEFINITION:

- Protrusion of peritoneal sac (with viscus or part of viscus) through an opening of weak part of abdominal wall.

— herniation of abd. contents through deepest layer of abd. wall (fascia).

— protrusion of contents from cavity to cavity or from cavity to outside

* SITES:

- 1- Inguinal hernia (most common): above inguinal ligament: either:-

- Direct ing. hernia: through inguinal (Hesselbach) triangle.

- Indirect ing. hernia: through inguinal canal.

- 2- Femoral hernia:- (below ing. lig) → through femoral canal.

- 3- Umbilical hernia:- through umbilicus & periumbilical area.

- 4- Epigastric hernia:- through linea alba above umbilicus. (in epigastrium)

- 5- Incisional hernia:- through abdominal scar.

→ Midway between the umbilicus & xiphoid.

- 6- Others:- rare hernias e.g.:-

- Obturator hernia: through obturator canal.

- Lumbar hernia: through lumbar triangle (Δ of Petit).

- Gluteal hernia: through Greater sciatic foramen.

- Sciatic hernia: through Lesser sciatic foramen.

- Spiegelian hernia: through linea semilunaris.

- Hiatus hernia: through esophageal opening of diaphragm.

- Morgagni hernia: through diaphragm (between costal & sternal origin of diaphragm).

- Puckdalek hernia: through pleuroperitoneal canal [in diaphragm]
it is congenital & more on Left side.

- Divercation of recti:- separation of linea alba (by stretching).

- Interstitial hernia:- between layers of ant. abdominal wall.

* CLASSIFICATION:-

- 1- According to site:- inguinal, femoral, ... etc.

- 2- According to aetiology:- Congenital & acquired.

- 3- According to visualization:- internal (e.g. hiatus hernia) & external.

NB: internal hernia may occur through epiploic foramen or iatrogenic through a defect left in greater omentum.

VISIT...

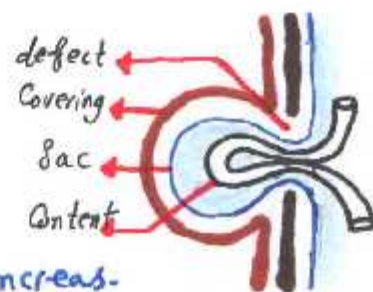
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* AETIOLOGY :-

- (A) Congenital :- e.g congenital inguinal hernia (reminant ^{vaginalis} Processus ~~var~~)
- (B) Acquired :- due to:
- 1- Increased intra abdominal Pressure :- by:
 - Chronic straining :- Cough, Constipation, benign prostate hyperplasia (BPH)
 - Occupational :- e.g Porters.
 - Abdominal swelling :- e.g Ascitis, Pregnancy, hepatosplenomegaly.
 - 2- Weakness of abdominal wall :- by:
 - Obesity & old age.
 - Pregnancy (stretching)
 - Previous operations.

* STRUCTURE :-

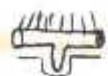
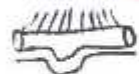
- 1- The defect :- through which the sac bulges.
 - 2- The sac :- usually peritoneum (Parietal P.).
 - 3- The Covering :- layers of abdominal wall.
 - 4- The content :- may be any organ "EXCEPT" Pancreas.
- Usually the contents : intestine or omentum.



	a :- omentum (omentalocele)	b :- intestine (enterocele)
Palpation	Doughy with smooth surface	Soft with Lobulated surface
Percussion	Dull / no bowel sounds	Resonant / may bowel sounds
special test	• reducibility of Last part is difficult due to adhesion	- 1 st part difficult due to gases. with gurgling.

• special contents :-

- a- Richter's hernia: herniation of part of antimesenteric wall of intestine. "occurs with Femoral hernia"
- b- Maydl's hernia: Two loops of bowel (Hernia in-W) the intermediate loop lies in peritoneal cavity.
- c- Littre's hernia: the content is Meckle's diverticulum. (Like Richter's hernia, strangulation may occur without intest. obst.)
- d- Sliding hernia: hernial sac is formed partially by the wall of an organ (e.g urinary bladder, cecum, ovary-) appendix & sigmoid.



e. Pantaloon (Dual-saddle) hernia: both direct and indirect inguinal hernias that surrounding the inferior epigastric vessels, (it is not rare).

truss is c/s in the femoral hernia

* COMPLICATION :

(incarceration = obstruction)

- ① Inflammation: usually due to use of a truss.
- ② Irreducibility: failure to return the contents into abdomen.
 - caused by adhesions between the contents themselves or between contents & sac.
- ③ Obstruction: occlusion of intestinal lumen with intact blood supply.
 - presented by constipation, colics, distension & vomiting.
- ④ Strangulation: intestinal obstruction with seriously impaired blood supply [Pathology: obstruction $\rightarrow$ $\uparrow$ to vein $\rightarrow$ $\uparrow$ venous pressure $\rightarrow$ oedema and congestion & hemorrhage $\rightarrow$ impair arterial blood supply $\rightarrow$ gangrene which $\rightarrow$ perforation $\rightarrow$ peritonitis].

	Irreducible	obstructed	strangulated
Acute obstruction	⊖	+	+
impulse on cough	+	+	⊖
Tend & tender	-	-	⊕

- NB: inflammation can $\rightarrow$ irreducibility $\rightarrow$ obstruction $\rightarrow$ strangulation.
- NB: Strangulation can be without intestinal obstruction: in cases of strangulated omentum, Richter's & Littre's hernia.
- Treatment of strangulated hernia :-
 - immediate resuscitation: - Ryle's (NGT) tube, urinary catheter, I.V. fluid, I.V. broad spectrum antibiotic.
 - immediate operation and examine intestine if viable or not
 - "Viable intestine: is pink, lustrous, pulsatile mesentery, bleeds if injured & contracts by pinching." presence of dark or bloody fluid intra-peritoneal + leucocytosis suggest nonviability.
 - if content is omentum excision done (viable or non viable)
 - if viable intestine $\rightarrow$ reduce to abdomen.
 - if non viable intestine $\rightarrow$ resection & anastomosis.
 - if Doubtful: $\rightarrow$ cover intestine by hot saline + Pure O₂ inhalation for 15 min then decide if viable or not.

⑤ other complication: as rupture hernial sac & hydrocele of sac.

● NB:- Strangulation varies according to type of hernia:-

- inguinal 2-4%
- incisional 3-5%
- Paraumbilical 15-20%
- Femoral 25-30%

- Although the incidence is higher in femoral hernia yet strangulated inguinal hernia account for >50% (as it is more common).

- Inguinal hernias account for 80% of all spontaneous hernias (umbilical $\approx$ 15%, femoral $\approx$ 5%, others are very rare) $\rightarrow$

"as written by Travers D. Crabtree, M.D 2000"

INGUINAL HERNIA

- indirect ing. hernia is more in Rt side & premature male.
- indirect $\approx$ 20 times more in male than female.

- It is the most common form of hernia, there are two types [Direct & indirect].

NB all indirect ing. H are congenital

	Indirect (oblique) H.	Direct ing. hernia
Age & sex	children & adult male	old age & always in male
site	arise from deep ing. ring.	arise from hasselbach Δ .
side	less common bilateral	more common bilateral
shape	Pyriform	rounded. covered by fascia transversalis only
reduction	upward, backward & laterally (opposite to line of descend)	- Backward only.
incidence	more common (5 times)	- less common incidence
Complication	more common	- less common. complications

*special types of indirect ing. hernia :-

indirect ing hernia is herniation through

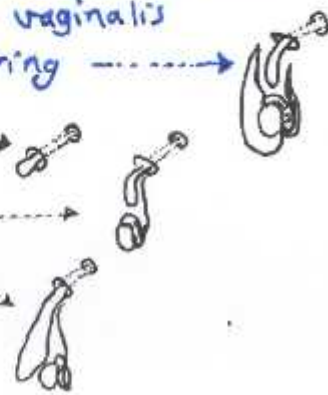
[1] Congenital hernia:- due to persistent Processus vaginalis.

- it reaches scrotum & may appear at adult life.

[2] Infantile hernia:- hernia sac passes behind tunica vaginalis which extends up to external ring $\rightarrow$

[3] Adult type:- which may be.

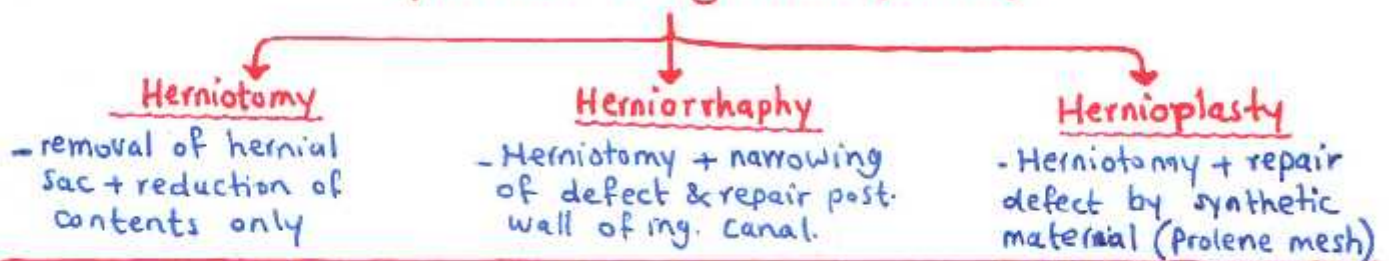
- Bubonocoele: hernia just bulges from ing. canal.
- Funicular type: hernia reach up to epididymis.
- Complete scrotal type: hernia in front of testis



* Management of inguinal hernia:-

- Treatment of hernia is surgery either elective or emergency (if obstructed or strangulated)
- Truss may be used if surgery is contraindicated, but they are (trusses) uncomfortable & unhygienic so the indications for a truss are rare.

"operations of ing. hernia (indirect)"



NB: Direct ing. hernia operations are herniorrhaphy and hernioplasty only i.e. no role for herniotomy alone.

[A] Herniotomy:

- indicated with infants & children (<12yr) → [bec. of good musculature]
- Steps. By incision parallel to medial 2/3 of ing. ligament (1 finger above) external oblique aponeurosis opened, avoid ilioing. nerve & the spermatic cord.
 - Identify the hernia sac (antero-lateral to cord)
 - the sac opened, contents reduced & neck of sac is transfixed and ligated then close in layers.

[B] Herniorrhaphy:

- indicated with large hernial defect in adult [or elderly & good musculature]

(1) **Shouldice repair:-** by dividing the fascia transversalis longitudinally then double brusing is done, i.e. the lower flap is sutured to under surface of the upper flap. → Enforce post. wall of ing. canal.

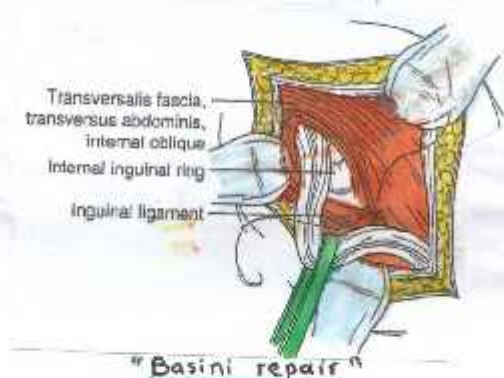


(2) **Bassini repair:-** by stitching the conjoint tendon ↓ down to the inguinal ligament behind the cord.

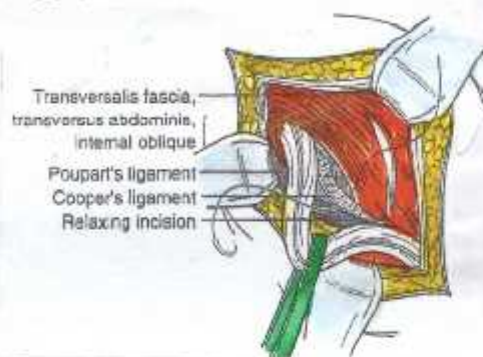
- It is unphysiological because it interferes with shutter mechanism of ing. canal during ↑ I.A.P. & very weak healing between tendons & ligament.

(3) **Mc Vay's repair** - approximates the conjoint tendon ^{& transv. fascia} to Cooper's ligament (pectineal lig.)

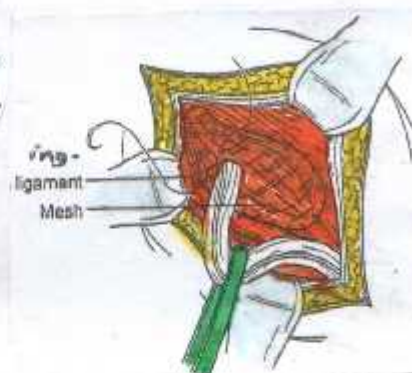
- This repair requires placement of a relaxing incision in the anterior rectus sheath (to release tension), this is called **Tanner slide**.



"Basini repair"



"Mc Vay's repair"



"Lichtensten repair"

C- Hernioplasty

- hernioplasty is indicated with old patient (weak musculature) and with wide defect, or recurrent hernias.
- The defect is repaired by synthetic material as proline meshes → operation called "Lichtensten repair"

***NB: Laparoscopy:** may be used to insert synthetic mesh over the hernia defect intraperitoneally [in recurrent or bilateral hernia]

- repair of choice of bil. ing. hernia in small child is high ligation

*Post operative complication:-

- 1- complication of anaesthesia.
- 2- recurrence of hernia in 3-10% of patients.
- 3- Wound infection in 1-3%.
- 4- Injury to structures as (ilioing. nerve, iliohypogastric N., genital br. -^{spermatic cord.} -rt)
- 5- Seroma & hematoma.
- 6- Temporary urinary retention is common.

Epigastric hernia → commoner in male (3 times)
- 20% are multiple-

FEMORAL H.

* Definition:-

- Herniation through femoral ring into femoral canal.
- It is acquired (never congenital).

* Incidence:

- The 3rd common after incisional hernia.
- Represents 20% of femal hernia [5% of male hernias].
- Common in female because of wide pelvis & pregnancies.

* Pathology:

- The sac passes through femoral ring downwards in femoral canal then forwards through saphenous opening then it passes upwards & laterally towards A.S.I.S.
- The neck is very narrow & oblique course → very high risk of irreducibility & strangulation. / it is usually of Richter type.

* Clinical picture :-

- Female (20-40 yr) ~~presenting~~ **(Rt)** > Lt side [20% bilateral]
- Presented by mass below & lateral to pubic ~~ligament~~ tubercle or by s/s of complication. (40% of F. hernia present by obstruction)
- Reduction is Downwards, backwards & upwards. [clinically impossible].

* Treatment 1. surgery:-

① Low approach (Lockwood):- (below ing. ligament.)

- open the sac, reduce contents, transfix as high as possible & excise, repair - done to femoral ring by suturing the inguinal lig. to pectineal (Cooper's) lig.



② High approach (Lotheissen's): (above ing. lig.)

- open the inguinal canal & same procedure as above.
- repair by suturing conjoint tendon to inguinal lig (Poupart's lig) then to pectineal (Cooper's) lig.



③ Preperitoneal approach:- (pararectal incision)

- opening the posterior rectus sheath & exposing the peritoneum, identify the hernia sac (reduce, transfix & excise)
- repair as Mc Vay's repair.



UMBILICAL H.

A] CONGENITAL UMBILICAL HERNIA "Exomphalos" :-

① Exomphalos minor:-

- Small defect ($< 5\text{cm}$) at umbilicus, sac is peritoneum contains usually bowel.
- covering is Wharton's jelly + layers of amniotic membrane.
- treated by reduce contents, excise & repair the defect.
- complication by injuring the bowel may occur while ligation of umbilical cord during labour.

② Exomphalos major:-

- Large defect ($> 5\text{cm}$) at abdomen centre, sac is peritoneum contains usually bowel $\pm$ Liver.
- covering are layers of amniotic membrane only.
- treatment difficult as defect is very large & abdomen cannot receive the contents so repair may take $>$ one operation.
- complication as rupture $\bar{E}$ peritonitis (cause of death.)

B] INFANTILE UMBILICAL HERNIA: (umbilical H.) $\rightarrow$ common in female (10 times)

- Caused by weakness of umbilical scar (infection, $\uparrow$ I.A.P. ... etc).
- defect from umbilical scar, sac small with wide neck.
- Usually closed spontaneously within 2 years.
- treatment by surgery (proline stitching of defect) $\rightarrow$ ^{or defect $> 1.5\text{cm}$} ~~may~~ done after 3 yrs
 $\rightarrow$ in 10% only

C] ADULT UMBILICAL H. "Paraumbilical H."

- usually in middle aged female [obese, multipara]
- occur just above (more) or below umbilicus (never umbilical).
- Defect in linea alba, narrow neck (more strangulation risk) with crescentic shaped sac.
- Treated by ~~suture~~ suture of the defect (after excising sac) and two-layer overlapping repair "Mayo repair"
- (hernioplasty in large defect)



INCISIONAL H.

(incisional H = Ventral H.)

* Definition:

- Hernia occurs through a defect in the scar of previous surgery.

* Aetiology:

- 1- Age: wound healing is poor in the older patient
- 2- General debility e.g. cancer, cirrhosis.
- 3- obesity.
- 4- Postoperative wound infection & hematoma.
- 5- raised I.A.P. after surgery e.g. cough, straining, ileus-----etc.
- 6- steroid therapy, anemia, hypoproteinemia
- 7- type of incision: Midline vertical wounds have a higher incidence than transverse incisions (as it is rare in Pfannestiel incision^{C/S}).
- 8- Poor suturing technique (too loose or too tight).

* Clinical Picture:

- May occur up to 5 yrs postop. as swelling through wound.
- usually defect is large (strangulation rare).

* Treatment:

- Small herniae: repair by interrupted nonabsorbable sutures.
- Large herniae: the old scar excised & normal rectus sheath identified, edges approximated with nonabsorbable sutures.
- Very large defect may need mesh repair "optimum ttt"
- * recurrence is high (10-20%).

N.B.: BURST ABDOMEN:

- is complete disruption of an abdominal incision in early postop. period

* Aetiology: As incisional hernia + malnutrition, ↓ vit C. usually 6-8 days

* Pathology: - may be complete (separated skin) or Partial (intact skin).

- Warning sign (RED sign) = serosanguinous discharge, soaks the dressing.

→ If intestine prolapse through wound → called Evisceration.

- If " does not prolapse " " → " Dehiscence.

* Treatment: after resuscitation the wound is closed as one layer by prolene (Tension sutures) & retained at least 3 weeks. and postoperatively Abdominal binder is used.

HERNIA NOTES - MCQ

- Direct ing. hernia can extend into the scrotum when it is large & chronic
- Epigastric hernia is often painful & usually contains only extra-peritoneal fat.
- Obturator hernia may produce pain along medial side of the thigh.
- in strangulated hernia cough impulse is negative.
- Femoral hernia sac may extend above inguinal ligament.
- ^{Re} Inguinal hernia may contain sigmoid colon, and ~~may~~ strangulate more frequently than lt ing. hernia.
- Littre's hernia contains Meckel's diverticulum, Amyand's hernia contains appendix.
- Femoral hernia & saphena varix may have cough impulse +ve
- Umbilical hernias defect usually closes within the first week of life, it is more common in premature babies

HERNIA MCA

* sliding H.H

- more in female > 40 yrs
- ~~fat~~ can. develop stricture
- ~~ttt~~ by fundiplication.

* Morgagni foramen "space of harrey"

- A communication in the diaphragm located immediately behind sternum (for sup. epig. vessels)
- it is the site for Morgagni hernia

* the most common type of cong diaph. hernia is caused by a defect through pleuroperitoneal fold.

* Direct ing. hernia

- arise through fascia transversalis
- can contain bladder as a part of wall of sac.
- has wide neck & always medial to inf. epig. artery
- can be called Ventral hernia → the most common site for ventral hernias are incisional H., umbilical hernia & inguinal hernia.

* Omphalocele

- is covered by peritoneum only.

* cong. umbilical hernia should be repaired surgically after child is 5 years old.

* epigastric H. is often painful, & usually only contains extra-peritoneal fat.

* Obturator H may produce pain along medial side of thigh

"Notes about hernia"

NB:- minor bilateral bulging of inguinal canal in slim individuals is normal & known as "Malgaigne's bulges"

NB:- An epigastric hernia can cause marked epigastric pain mimicking that of peptic ulcer.

NB:- Rectus hematoma :- swelling developed after abdominal wall straining (cough, lifting, ... etc) due to tearing of inf. epig. artery branches, common in elderly on anticoag. and may be confused with hernia [in lower part rectus sheath]

NB:- Desmoid tumour :- slow-growing tumour of rectus abd. muscle usually in young female, may be related to Gardner syndrome & may follow pregnancy, hard tumour. - it is a tumour of spindle cells $\rightarrow$ risk of local recurrence after excision. $\rightarrow$ musculoaponeurotic structures.

NB:- External spermatic fascia is not a content of the inguinal canal.

NB:- Contents of ing. canal are 1. (ilioing. nerve & spermatic cord) :-

(A) 3 nerves :- ilioinguinal, genitofemoral & symp. nerves.

(B) 3 arteries :- testicular, cremasteric & a. to the vas.

(C) 3 structures :- Pampiniform plexus, lymphatic & vas deference.

NB:- people $\bar{e}$ high conjoint tendon more prone to ing. hernia.

= Conjoint tendon is responsible for shutter mechanism

that closes ing. canal during coughing, strain, ... etc

NB:- indirect ing. hernia called oblique ing. hernia (OIH)

Notes

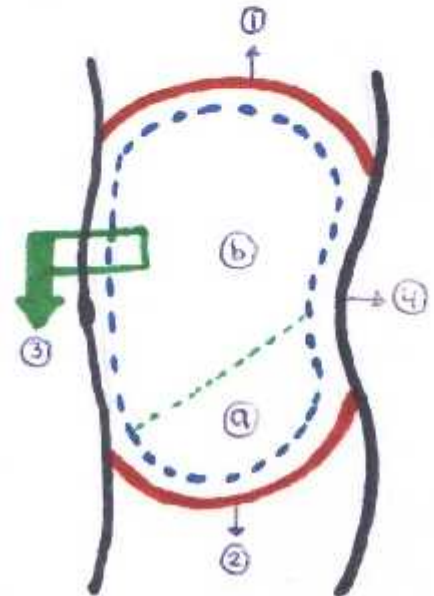
- Guarding: voluntary ms contraction
- Rigidity: involuntary ~ ~
- tenderness: pain on pressure
- Rebound tenderness: ↑ pain on release (peritonism).
- shifting tenderness: differentiate between acute appendicitis from mesenteric lymphadenitis by turn the pt to left side if tenderness is shifted → mesenteric lymphadenitis.
- Murphy sign: - for acute cholecystitis.
 - occurs on pressure bec. of contact between parietal & visceral peritoneum
- Spleen to be palpable must ↑ by 2.5 folds. (400g)

Anatomy of abdominal wall

ABDOMINO-PELVIC CAVITY :

- This cavity is divided into :
pelvis (a) - and abdomen proper (b)
- It's bounded by :

- ① superiorly → diaphragm ①
- ② Inferiorly → pelvic diaphragm ②
- ③ Anteriorly → ant. abd. wall.
- ④ Posteriorly → post- abd. wall.
- ⑤ laterally → extension of ant- abd- wall muscles.

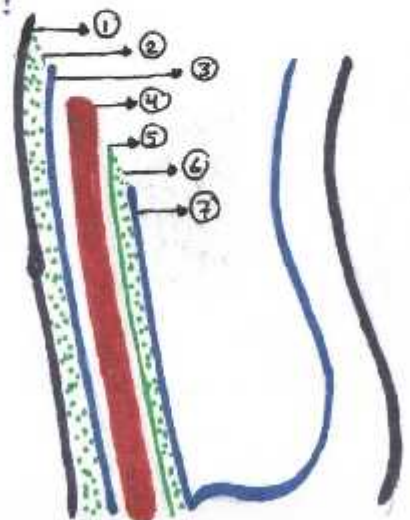


ANTERIOR ABD. WALL

A.A.W

- The layers of ant. abdominal wall are :

- ① skin → I
 - ② Superficial fatty layer
 - ③ Deep membranous layer
 - ④ abdominal muscles
 - ⑤ fascia transversalis
 - ⑥ Extraperitoneal tissue
 - ⑦ parietal peritoneum
- superficial fascia II
- deep fascia



IV FASCIA TRANSVERSALIS

- It's the forth layers of abd. wall (i.e. between III & V).
- Inferiorly it forms the anterior wall of femoral sheath.
- It has an opening in its lower part ($\frac{1}{2}$ inch above midinguinal point) called **Deep inguinal ring** just lateral to inferior epigastric artery.
- The deep ring is oval in shape & transmits the spermatic cord (in male) and round lig. of uterus (in female) & gives origin to "internal spermatic fascia."



V EXTRAPERITONIAL TISSUE

- Fascia transversalis continuous above with diaphragmatic fascia & below with iliacus fascia & pelvic fascia.

- It's the fifth layer [between IV and VI (peritoneum)]
- It's loose connective tissue filled mainly with fat.

MUSCLES OF A.A.W

- Muscles of ^{anterolateral} abd. wall are 6 muscles each side :-
- 3 are paramedian $\rightarrow$ ① rectus abdominis.
② pyramidalis.
③ cremasteric.
- 3 are flat ms. $\rightarrow$ ④ External oblique.
⑤ Internal oblique.
⑥ Transversus abdominus.

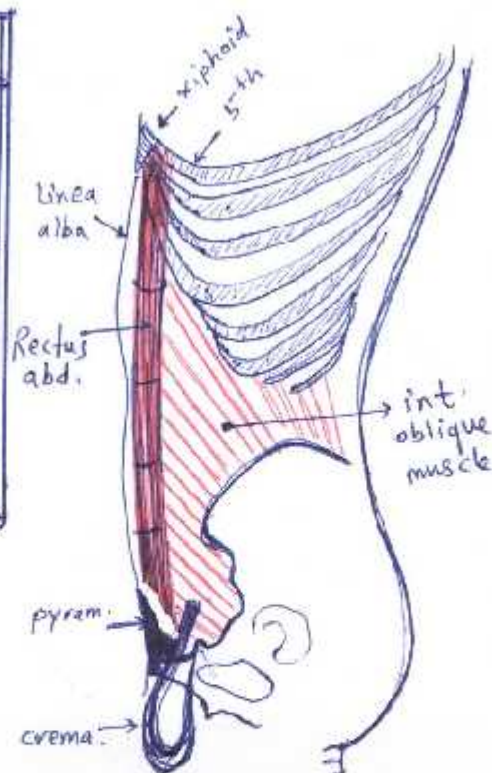
* action of A.A.W muscles:-

- ① support ^{& compress} viscera in place, & ↑ intraabdominal pressure.
- ② protect viscera
- ③ respiration.
- ④ Flexion of trunk by rectus abdominis. & assisted by other muscles.
- ⑤ suspend testis by cremasteric ms. (cremaster = elevator)
[pyramidalis tenses the linea alba]

* Nerve supply of A.A.W. muscles:-

- Rectus abdominis —————→ by lower 6 thoracic
- Internal oblique ^{external} & transversus abd. → by lower 6 thoracic & L1 nerves
- pyramidalis → by subcostal (T12)
- Cremasteric ms. → by "Genital branch" of genitofemoral N.

	origin	insertion.
① Rectus abdominis	pubic crest symphysis pubis	5 th , 6 th & 7 th costal cartilage Xiphoid process.
② pyramidalis ↳ may be absent	pubic crest	linea alba (lower part)
③ Cremasteric	internal oblique muscle fibers	pubic tubercle (after forming loop around testis)



*Note:- rectus ms. is divided into segments by tendinous intersection and involved in rectus sheath. (usually 3 intersections
 ↳ at xiphoid
 ↳ at umbilicus
 ↳ halfway between these two)

RECTUS SHEATH

Definition

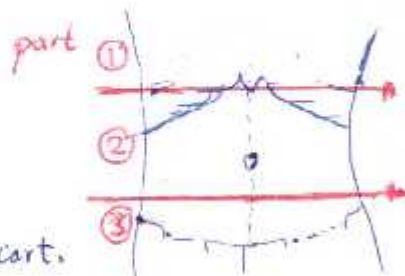
- It's the aponeuritic sheath that enveloping rectus abd. ms.

Parts

① First part - above costal margin.

• formed - anteriorly by ext. obl. apn.

- posteriorly by 5th, 6th, 7th cost. cart.



② Second part - from costal margin to a line midway between umbilicus & symph. pubis. (at ASIS level)

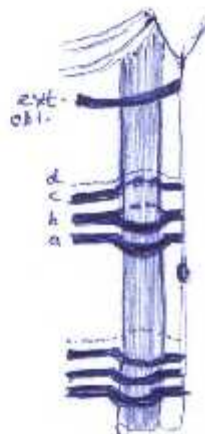
• formed - anteriorly by ext. obliq. + anterior lamella.

- posteriorly by transv. abd. + posterior lamella.

③ Third part - from previous line to symph. pubis below.

• formed - anteriorly by 3 ms apn. (ext., int., trans)

- posteriorly by fascia transversalis



- arcuate line is the lowermost line of post. wall of rectus sheath.
- at this level inf. epigastric vessels enter rectus sheath.

N-B: internal oblique in the second part is

divided into ant. lamella (in front rectus) and post. lamella (behind the rectus).

a = ext. obl.
b = int. "
c = trans. abd.
d = fascia trans.

- linea semilunaris is the lateral margin of rectus abdominis.

Contents of R. sh

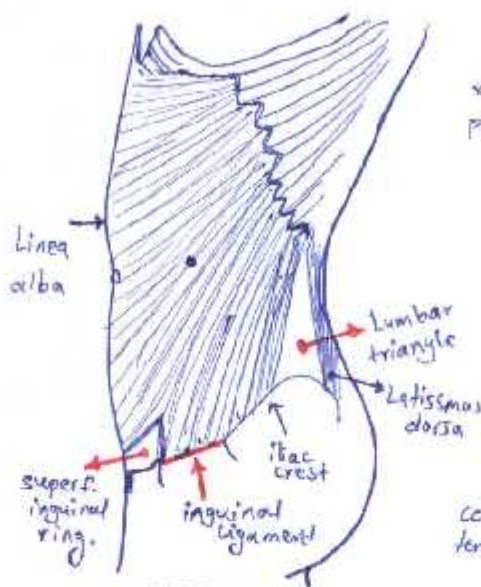
- linea alba: fibrous band from xiphoid to symph. pubis, formed by fusion of aponeurosis of 3 muscles from 2 sides.

■ 2 muscles → rectus abd. & pyramidalis.

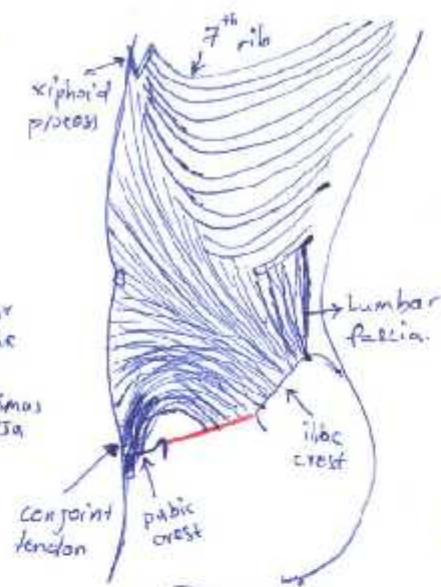
■ 2 vessels → superior & inferior epigastric vessels.

■ 2 nerves → lower 5 intercostal & subcostal nerves.

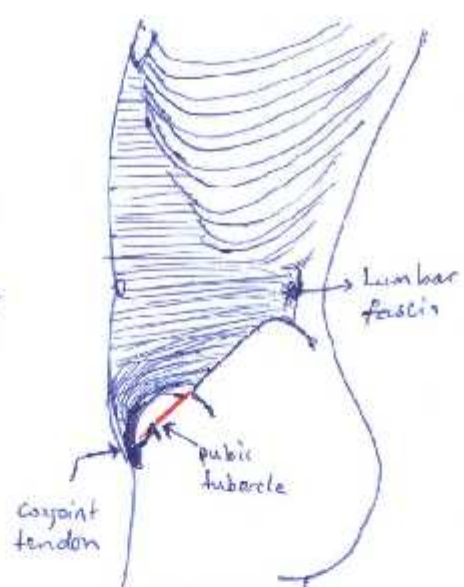
■ Lymphatics, vessels.



EXTERNAL
OBLIQUE
OUTER

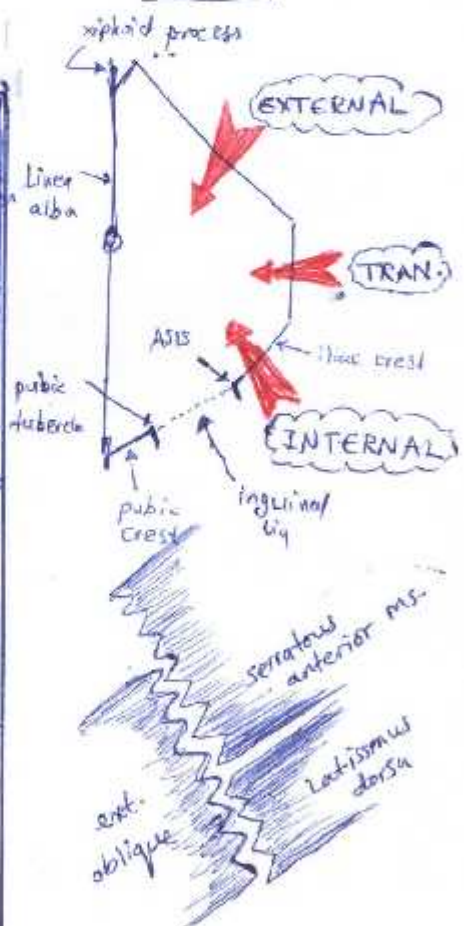


INTERNAL
OBLIQUE
MIDDLE



TRANSVERSE
ABD.
INNER

	4	5	6
	EXTERNAL OBLIQUE	INTERNAL OBLIQUE	TRANSVERSE ABD.
origin	• lower 8 ribs (by 8 digitis which interdigitate with 4 digits of latiss. dorsi & lower 4 of serratus ant.)	• Lumbar fascia. • iliac crest (2/3) • inguinal lig. (lat. 2/3)	• interdigitate with diaphragm • lower 6 ribs. • Lumbar fascia. • iliac crest (2/3) • ing. lig. (lat. 1/3)
insertion	• xiphoid, linea alba, pubic crest & tubercle, ASIS & iliac crest (ant. 1/2)	• lower 6 ribs, xiphoid, linea alba, pubic crest & pectineal line	• xiphoid, linea alba, pubic crest & pectineal line.
special character	• superficial ing. ring. • inguinal lig. • Lumbar Δ	Conjoint tendon	Conjoint tendon
Direction of fibers	Downward forward & medially	upward, forward, medially	horizontally forward



ASIS = ant. sup. iliac spine.

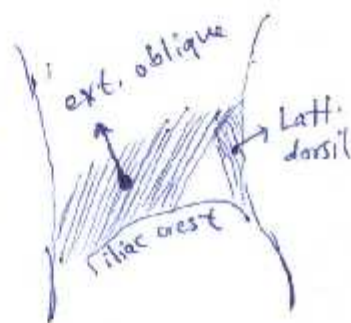
*** SUPERFICIAL ING. RING :

- It's a triangular opening in the aponeurosis of external oblique muscle just above & ~~above~~ ^{Medial} to pubic tubercle.
- It gives origin to "external spermatic fascia" around spermatic cord & testis. "margins of the ring called crura"
- It gives passage to ① ilioinguinal nerve.
- ② spermatic cord (in male) or round lig. of uterus (female).
- It may be the site for "indirect inguinal hernia"



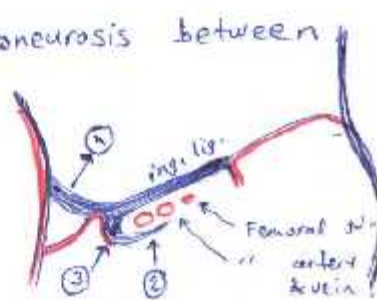
LUMBAR TRIANGLE :

- Boundaries:-
 - anteriorly:- external oblique (post. border)
 - posteriorly:- Latissimus dorsi. (lat. border)
 - inferiorly:- iliac crest (middle part).
- It may be site for "Lumbar hernia"



* (INGUINAL LIGAMENT):- (Poupart's lig.):

- It's the lower rolled border of ext. oblique aponeurosis between pubic tubercle (medially) & ASIS (laterally)
↳ ant. sup. iliac spine.
- It's lower surface is convex to the thigh due to attachment into fascia lata of thigh.
- Extension:-
 - ① reflected ligament → upward medially to linea alba.
 - ② pectineal lig. → (Cooper's lig) → laterally.
 - ③ Lacunar lig → triangular, it's the start of pectineal lig.



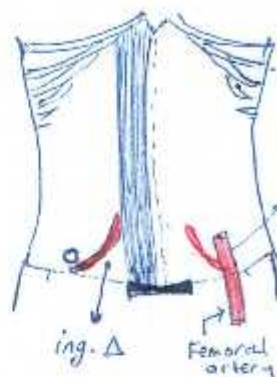
* CONJOINT TENDON :-

It's the lower most fibers of internal oblique & transv. abd. which arch to be attached to (pubic crest & pectineal line) inferiorly, (linea alba) medially & free laterally



* INGUINAL TRIANGLE (Hasselbach's Δ)

- Bounded ① medially :- by rectus abd. (lat. border).
- ② superolaterally :- by inf. epigastric artery.
- ③ inferiorly :- by ing. lig. (medial $\frac{1}{2}$).
- It may be the site of "Direct inguinal hernia"



* INGUINAL CANAL

- It's ^{oblique intramuscular} passage between the deep & superficial inguinal rings.
- It's about one & $\frac{1}{2}$ inches (4 cm) ^(1.5) directed downward & medially parallel & above to inguinal ligament.
- * Boundaries :- 2 ant. :- external oblique & internal oblique (lat. $\frac{1}{3}$).
- 2 post. :- fascia transv. & conjoint tendon (+reflected lig.)
- 2 above :- internal oblique & transv. abd. ^(medial $\frac{1}{3}$) ^(medial $\frac{1}{4}$)
- 2 below _(floor) :- inguinal lig. & Lacunar lig. _(medial end)

* Contents (passing through it) :-

- 2 in male $\rightarrow$ ilioinguinal nerve & spermatic cord.
- 2 in female $\rightarrow$ ilioinguinal nerve & round lig. of uterus.

N.B:- in newborn deep ring lies almost directly posterior to superf. ring.

* SPERMATIC CORD

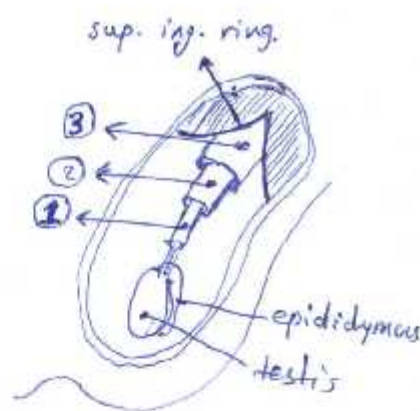
- It's a cord that contains vas deferens & N, A, lymph of testes from deep ing. ring to back of testes (structures are from abd.)

- Contents :-

- ① vestige of processus vaginalis (embryo)
- ② vas deferens - (45 cm)
- ③ artery to vas deferens (inf. vesical)
- ④ artery to cremasteric (inf. epigastric)
- ⑤ Nerve - " - (genital br. of genitofemoral nerve)
- ⑥ Lymphatic of testes.
- ⑦ sympathetic N. of testes.
- ⑧ testicular artery.
- ⑨ pampiniform plexus of veins.

Covering of spermatic cord

- ① internal spermatic fascia (from fascia transv.)
- ② Cremasteric muscle & fascia (from int. oblique).
- ③ external spermatic fascia (from external oblique).



LAYERS OF SCROTUM

= (COVERING OF TESTES) :-

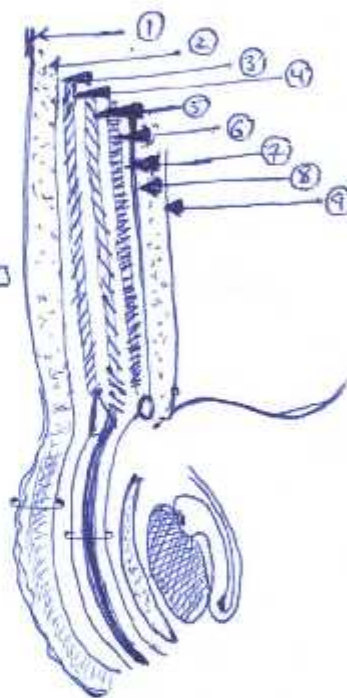
- As the testes descend from abdomen to scrotum it takes covering from ant. abd. wall layers

- the covering of testes are

- a) skin → ①
- b) dartos ms (instead of sup. fatty layer) ②
- c) membranous layer of sup. fascia (from ③)
 ← Colles fascia
- d) ext. spermatic fascia (from ext. obl.) ④
- e) cremasteric ms & fascia (from int. obl.) ⑤
- f) int. spermatic fascia (from fascia trans.) ⑦
- g) parietal layer of tunica vaginalis
- h) visceral ~ ~ ~ ~ ~
- i) Tunica albuginea (testis capsule).

covering of sp. cord.

from peritoneum ⑨



N.B.:- Lymph drainage of scrotum to superficial inguinal LN while testis to Paraortic LN

N.B.:- transversus abdominus muscle (6) is not involved in covering of testis bec. its arch is higher than that of internal oblique (as it take only 1/3 of ing. lig.)

N.B.:- dartos ms innervated by sympathetic nerves & causing skin wrinkling of scrotum.



FMORAL TRIANGLE

• Triangular intermuscular space in upper medial $\frac{1}{3}$ of thigh.

* Boundaries :-

- superior (base): inguinal ligament
- Laterally :- Medial border of sartorius.
- Medially :- Medial border of adductor longus.

* Roof (anterior wall) :-

- Skin & superficial fascia (with its contents)
- Deep fascia (lata) with saphenous spring.

- ① great saph. vein
 - ② sup. ing. LN. (vertical & Hori)
 - ③ three sup. br. of femoral a
 - ④ cut. Nerves
- Femoral br. of GF nerve
T12, ilioing
intermed
cut. of thigh

* Floor (from Lat. to Medial) :-

- Iliacus, Psoas, pectineus & adductor longus

* Contents :-

- 1-(Nerve) :- Femoral nerve & its branches, Lat. cut. N. of thigh.
 - 2-(Artery) :- Femoral artery & its branches.
 - 3-(vein) :- Femoral vein & its tributaries.
 4. (LN) :- deep inguinal LN.
- Fatty c.T.
- } covered by Femoral sheath

* Femoral sheath :-

- Fascia ^{surrounds} covering femoral vessels for about 1 inch below ing. lig.
- Anterior wall is continuation of fascia transversalis ^{ant. abd. wall} while posterior wall is continuation of fascia iliaca ^{post abd. wall}.
- Compartments of femoral sheath are
 - Medial → Femoral canal,
 - Intermediate → Femoral vein.
 - Lateral → Femoral artery & Femor br. of genitofemoral N.

* Femoral canal :-

- Medial compartment of femoral sheath, about $\frac{1}{2}$ inch. ^{For expansion of femoral vein.}
- Its upper opening called Femoral ring & closed by Femoral septum.
- Contents are ① Fatty c.T. ② one deep inguinal LN (Cloquet LN).
- ③ efferent lymph vessels from deep ing. LN.

lower end of canal adheres to tunica adventitia of femoral vein.

* Femoral ring :-

- Upper opening of femoral canal, closed by femoral septum (condensation of extraperitoneal tissue).
- Boundaries :-
 - Anterior :- inguinal ligament.
 - Medial :- Lacunar ligament.
 - Posterior :- Pectineal Lig. (& superior ramus of pubis)
 - Lateral :- femoral vein.

* Femoral hernia :-

- Protrusion of peritoneum into the femoral canal through the femoral ring (as canal is a weak area in abdomen).
- It is more common in female. due to wide pelvis (wide ring).

